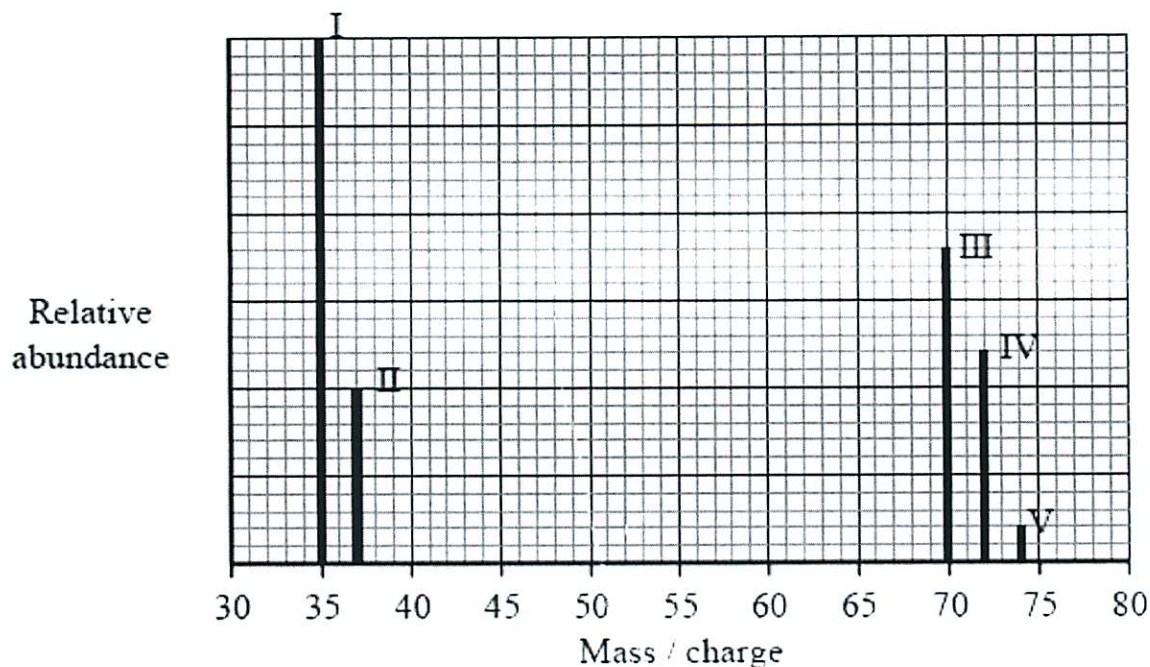


# Mass Spectroscopy Worksheet AP Chem

1. The diagram below represents the spectrum of chlorine, consisting of five peaks, labeled I, II, III, IV, and V, respectively. **Peak I is due to the  $^{35}\text{Cl}^+$  ion.**



a. What analytical technique would give a spectrum like that shown above?

Mass Spectroscopy

b. How many different isotopes exist for chlorine atoms?

2  $^{35}\text{Cl}$   
 $^{37}\text{Cl}$

c. State why the spectrum of chlorine consists of more peaks than your answer above.

B/c the outer peaks are from diatomic Chlorine molecules

d. Suggest what peaks II and IV might be due to.

Peak II is  $^{37}\text{Cl}$

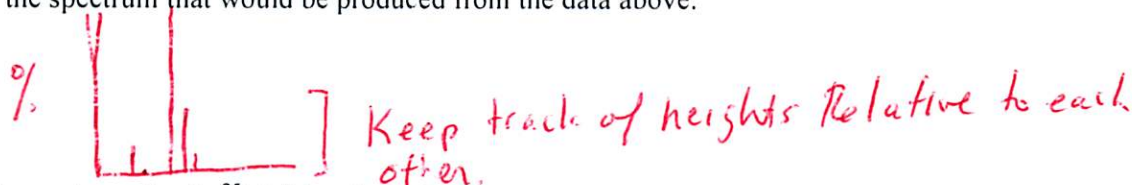
Peak IV is diatomic  $^{35}\text{Cl}-^{37}\text{Cl}$  so it's mass is 72

2. The mass spectrum of a sample of chromium shows four peaks. Use the data below to calculate the relative atomic mass of chromium in the sample. Give your answer to two decimal places.

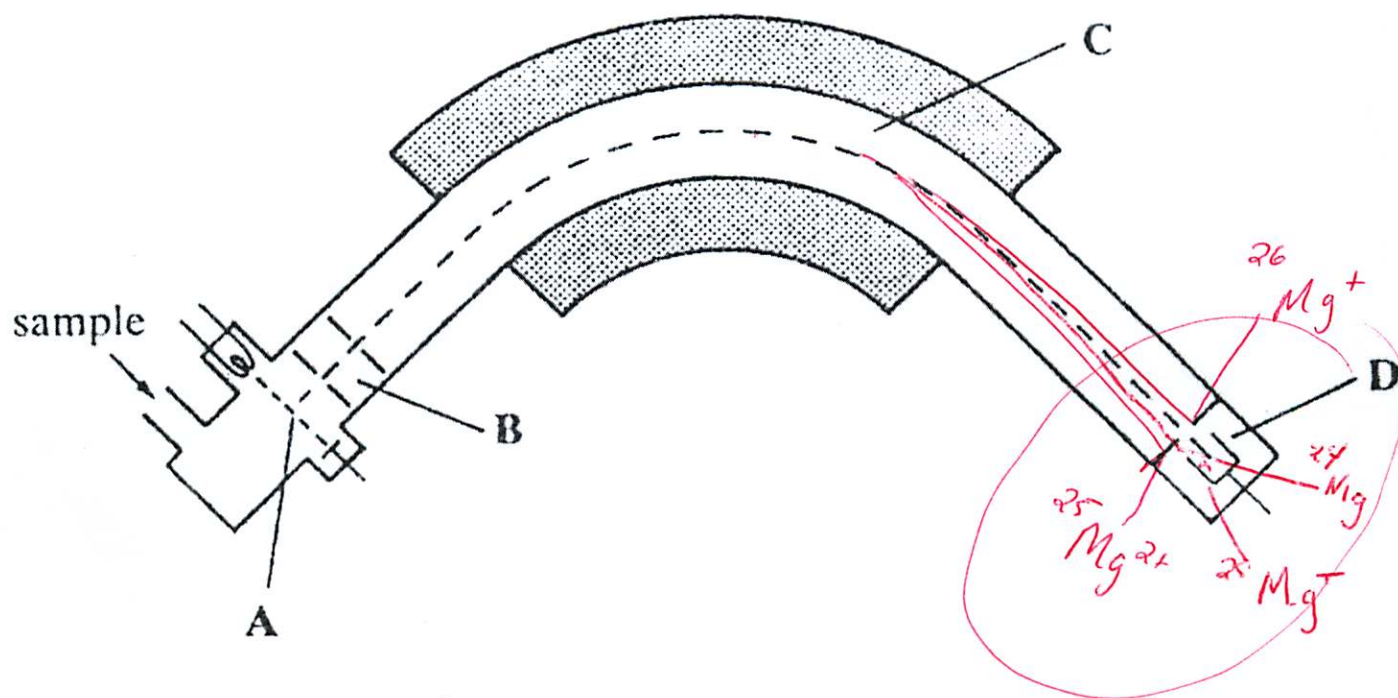
Mass	50	52	53	54
Relative Abundance (%)	4.3	83.8	9.5	2.4

$$50 \text{ amu} (0.043) + 52 \text{ amu} (0.838) + 53 \text{ amu} (0.095) + 54 \text{ amu} (0.024) = 52.06 \text{ amu}$$

Draw a sketch of the spectrum that would be produced from the data above.



3. The diagram shows the path of a  $^{25}\text{Mg}^+$  ion through a mass spectrometer.



The following processes are taking place at A, B, C and D.

- A = Ionization of the sample of Mg atoms, by an electron beam.
- B = Acceleration of the ions with a electric field.
- C = Deflection of the ions with a magnetic field.
- D = Detection of the ions.

On the diagram, sketch the path of the following ions under the same conditions:

- i)  $^{24}\text{Mg}^+$  ion labeled P
- ii)  $^{26}\text{Mg}^+$  ion labeled Q
- iii)  $^{25}\text{Mg}^{2+}$  ion labeled R

